



# ***“GLOBAL FOOD SECURITY CHALLENGES: MONITORING EARTH RESOURCES”***

***USDA Foreign Agricultural Service, Office of Global Analysis  
Bradley Doorn  
Division Director, USDA FAS OGA***



# Agenda

- **Session I** – Reshaping our Resources to Address Global Food Security
- **Session II** – Government Collaboration
- **Session III** – Government Solutions And Research for World Food Supply Challenges
- **Conclusions**



# **Session I – Reshaping our Resources to Address Global Food Security**



# What Brought Us Here Today?

- Environmental Challenges
- Global Security Challenges
- Need for Constant Observation, Analysis, Monitoring and Reporting to support these challenges
- Need for closer partnerships



# Partnership Solutions

- **USDA FAS OGA – Provides Leadership in these Partnerships**
  - We are the Global Analysis and Monitoring Resource for the government
  - How do other entities fit in? Everyone has a Role
    - Public Sector – DOD, NGA, USAID, FAO
    - Private Sector
    - Not for Profit Sector
- **USDA FAS OGA – Is the Baseline Analysis and Monitoring Provider**

# Partners Session I

- Colonel Stephen J. Lynch, JCS, J5 SIAD
  - **Paradigm Shift for DOD –**  
**It is Less Expensive to be Proactive than Reactive**
  - **Must work more with Interagency Partners per GAO and DNI**
  - **As part of a System of Systems Food Security must be addressed along with Demographics, Water, Energy, etc. –**  
**MUST HAVE STRATEGIC APPROACH**





# Partners Session I

- Dan Whitley, Director, Trade and Biofuels Analysis, USDA FAS OGA
  - **Energy and Food Prices are linked and related.**
  - **Must Educate and Partner to improve Production Practices**
  - **Must Increase Global Production & Allow Markets to Work – Global Trade**





# Partners Session I

- Jonathan Gressel, USDA FAS Former Agricultural Counselor/Baghdad
  - Difficulty in Crop Forecasts in Conflict Zones
  - USDA addressed this Political/Military perspective by partnering with NGA, State, Multi-National Forces -1, etc.







# Session I Take-Away

- **Global Monitoring and Analysis – OGA our Daily Mission**
  - Working together provides the baseline knowledge for Monitoring and Analyzing Global Earth Resources
  - The world is now focusing on Food Security which is what USDA does in our daily mission



# Operational Global Monitoring:

USDA FAS OGA



# Mission:

*To produce the most objective and accurate assessment of global agricultural production and conditions affecting food security in the world.*

**+30 Year History**  
(LACIE-AgriStars legacy)

***NRC, <http://www.nap.edu/ssb/rapch2.htm>***

**Responsible for Deriving a US Principle  
Federal Economic Indicator**

3 JUNE 74

25 JUNE 75





# Food commodity price reviews since 1970

USDA Foreign Agricultural Service

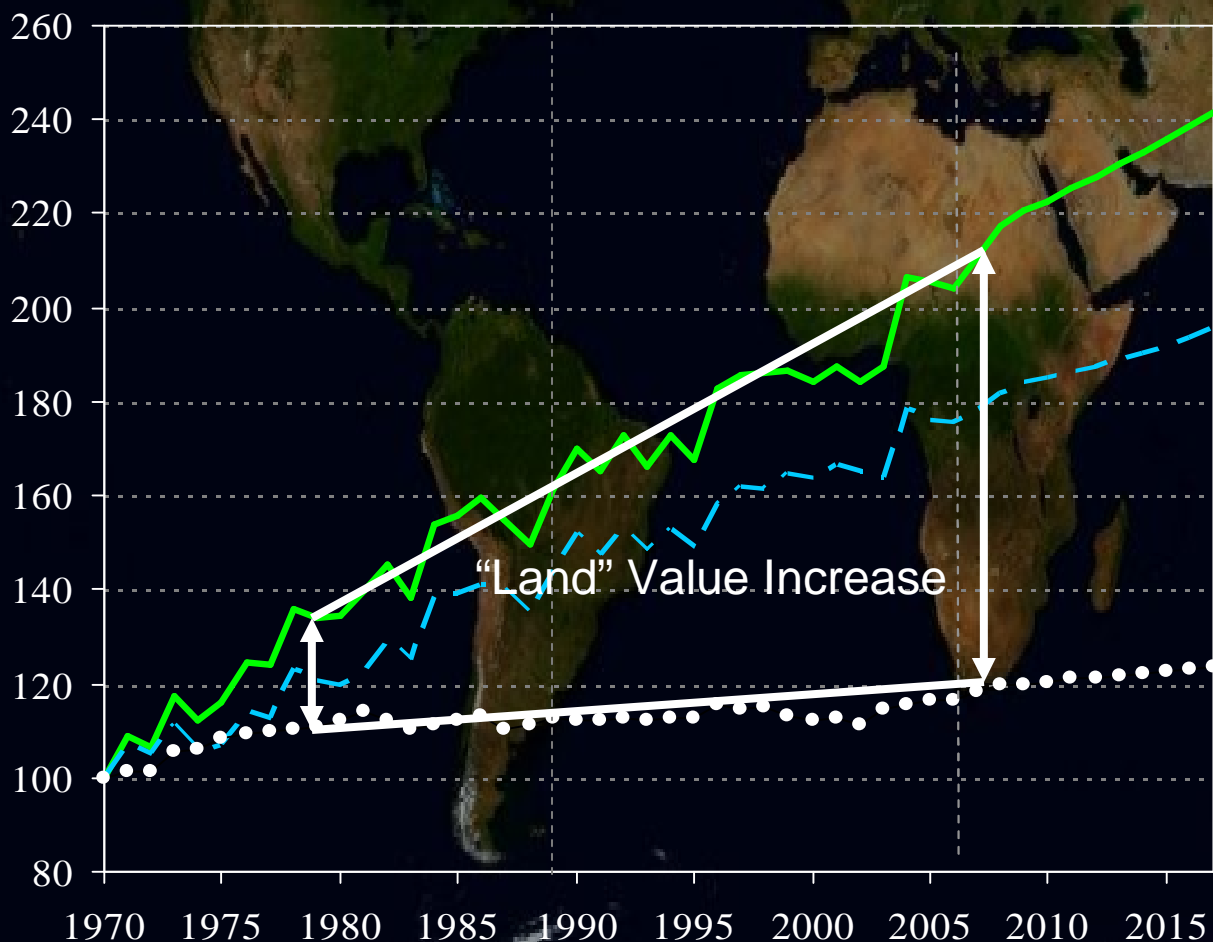
Index: January 1990 = 100



# Total world grain & oilseeds<sup>1</sup>

## Production, yield, & area harvested

Index: 1970 = 100



— Production  
- - Yield  
• Area harv

Exponential trend growth rates:

	1975-90	90-07	07-17
Prod	2.2	1.3	1.2
Area	0.15	0.17	0.40
Yields	2.0	1.1	0.8

<sup>1</sup> Total oilseeds = soybeans + rapeseed + sunflowers





# Session II- Government Collaboration- PANEL

“Keys to Overcoming Global Food Security  
Challenges”





## Panel Session II

- Carl Stuekerjuergen, Director, eGEOINT, National Geospatial-Intelligence Agency
  - **IT Service Oriented Architecture in Process**
  - **Multiple uses of imagery especially in Food Security**
  - **NGA is successfully collaborating and intends to continue to do so in the future**



## Panel Session II

- Dr. Stanley Wood, International Food Policy Research Institute
  - There is a **geospatial component** in all **International Agriculture ESPECIALLY** in **Global Food Security**
  - Most difficult to assess and analyze are **Global Crops at Regional and Sub-Regional Level**
  - Let's join **Ground Support Svcs.** To work more closely together



## Panel Session II

- Gary Eilerts, Program Manager, USAID, FEWS-NET
  - **Changes in Lifestyle greatly changing food supply**
  - **Must join geographic and socio-economic information together in order to really understand food crisis management**
  - **To answer the question “where are the hungry?” WE MUST PARTNER**

# Panel Session II

- Bradley Doorn,  
Division Director,  
USDA FAS OGA
  - Timely Data
  - Collaboration
  - Communication







# Session II Take-Away

- Panel Solutions:
  - 1. We are Partnering but Progress is slow
    - big government takes longer to change
  - 2. Must Share more Data and not fight over the same government budgets which impedes our progress
  - 3. We do have successful collaboration projects
  - 4. OGA Solutions In Operation Today

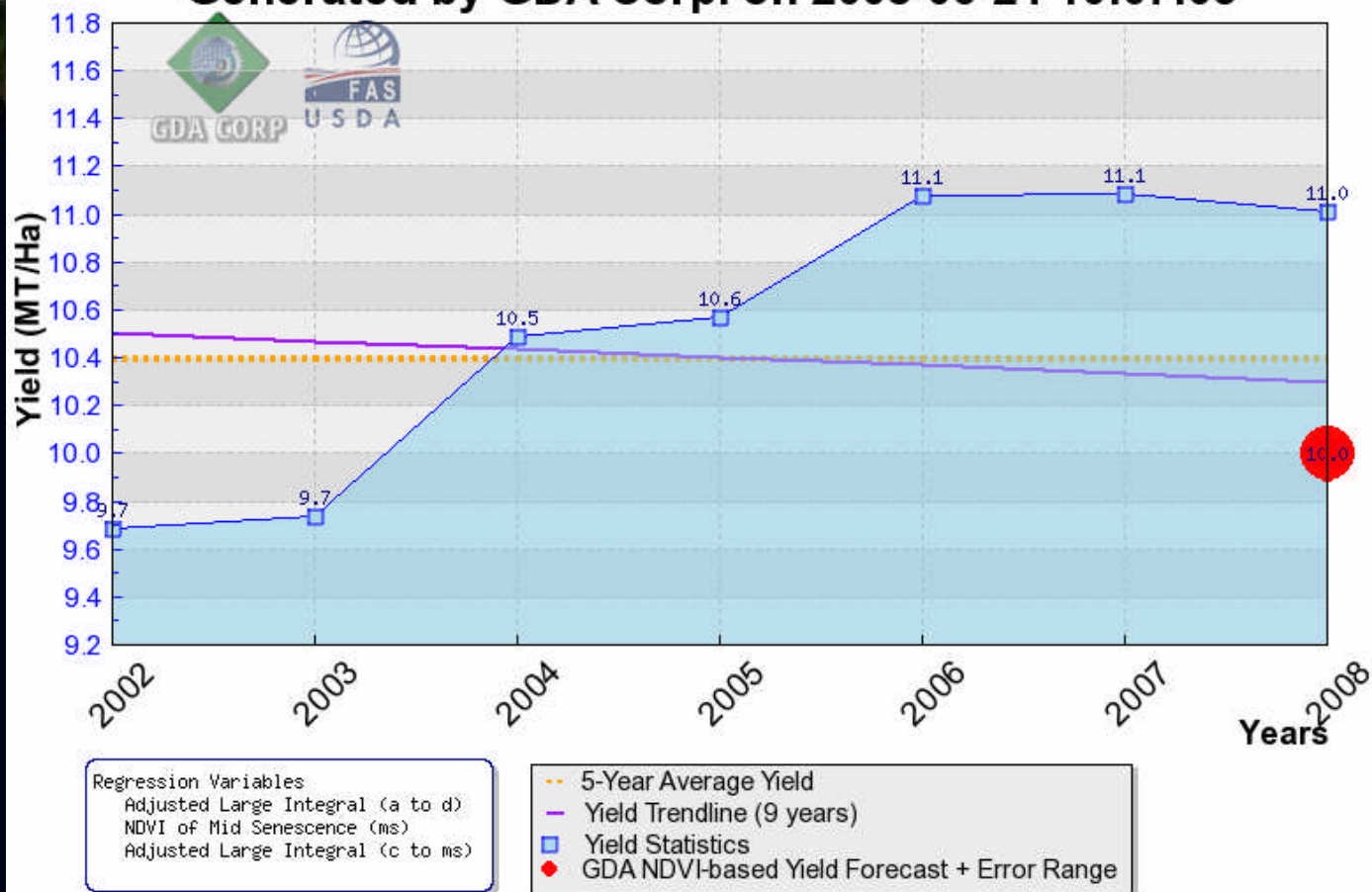


# **Analyzing Major Agriculture Producers that Impact Global Food Supplies**

**USDA FAS OGA**

# Yield Estimates Based on GLAM-produced MODIS imagery AFRICA

**Yield : Maize : South Africa, Northern Cape**  
Generated by GDA Corp. on 2008-06-24 10:07:05



Source of crop yield statistics: RSA Crop Estimates Committee  
<http://www.sagis.org.za/Flatpages/0esskatingdekbrief.htm>

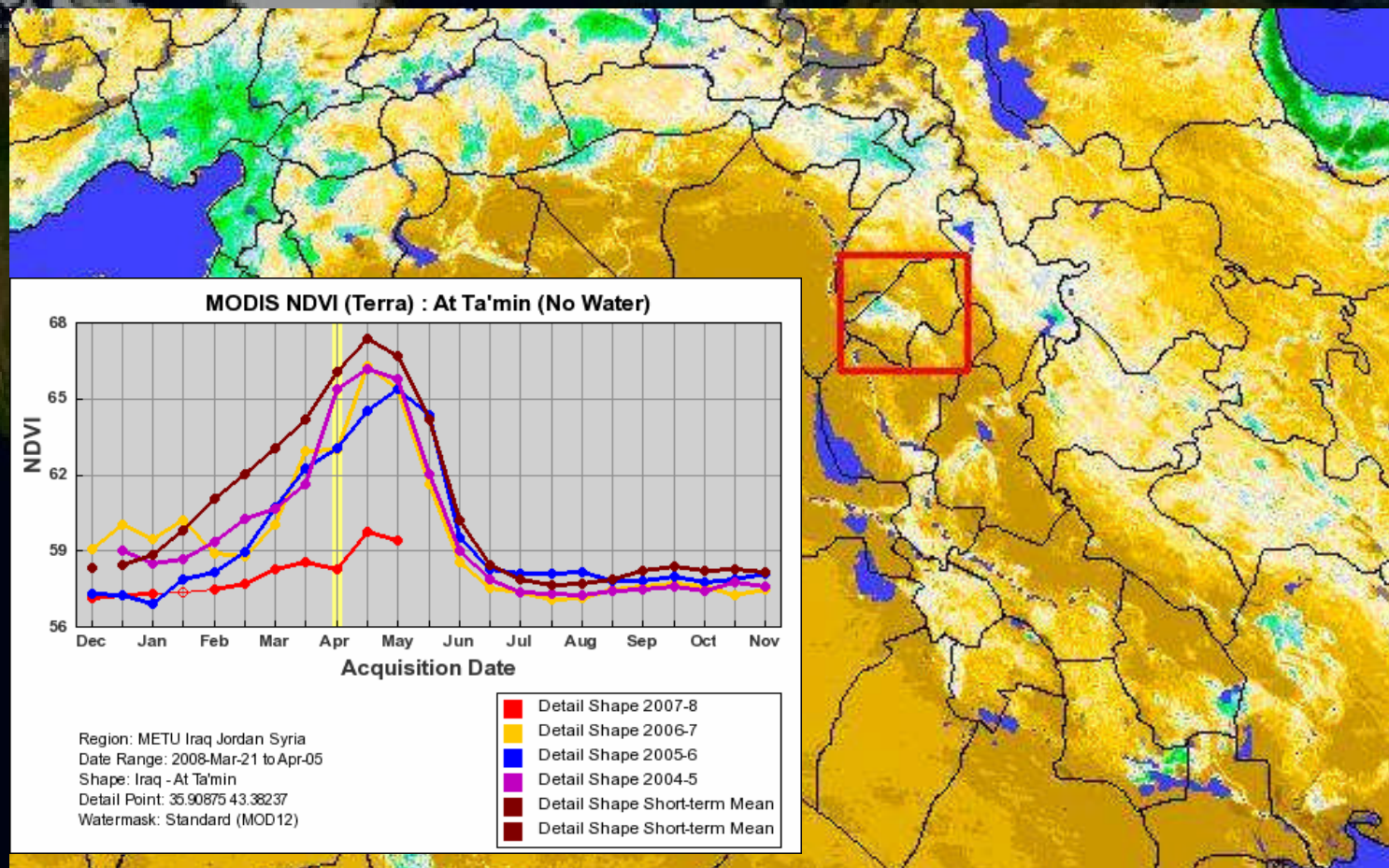


# Analyzing Regions with Sparse/Poor Information Reporting

## USDA FAS OGA



# Assess Vegetation Regionally



Source: USDA-FAS Crop Explorer

<http://www.pecad/fas/usda.gov/cropexplorer>

Data Source: MODIS NDVI 16-day composite (March 21 to April 5, 2008)

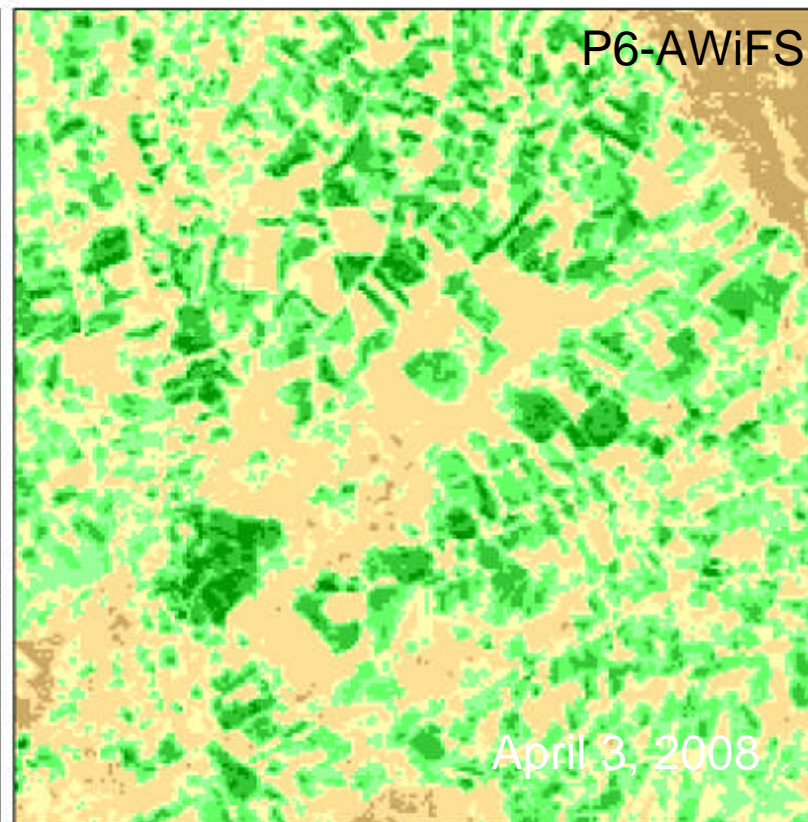
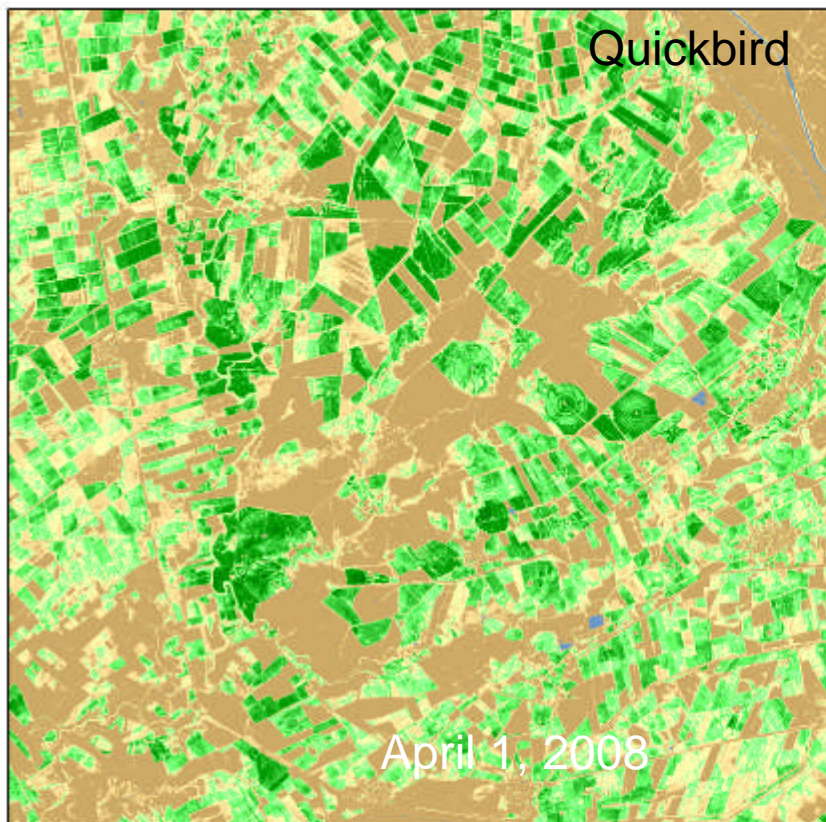
via NASA/University of Maryland





USDA Foreign Agriculture

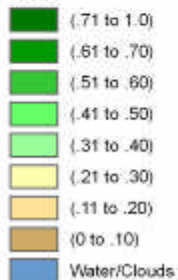
# Add Information Locally



## Legend

### Crop Abundance

#### NDVI



Validation (Threshold NDVI > .30)

1. AWiFS IRS P-6 = **10,915.2** hectares
2. Quickbird MS = **10,015.8** hectares



# Disaster Response

**USDA FAS OGA**

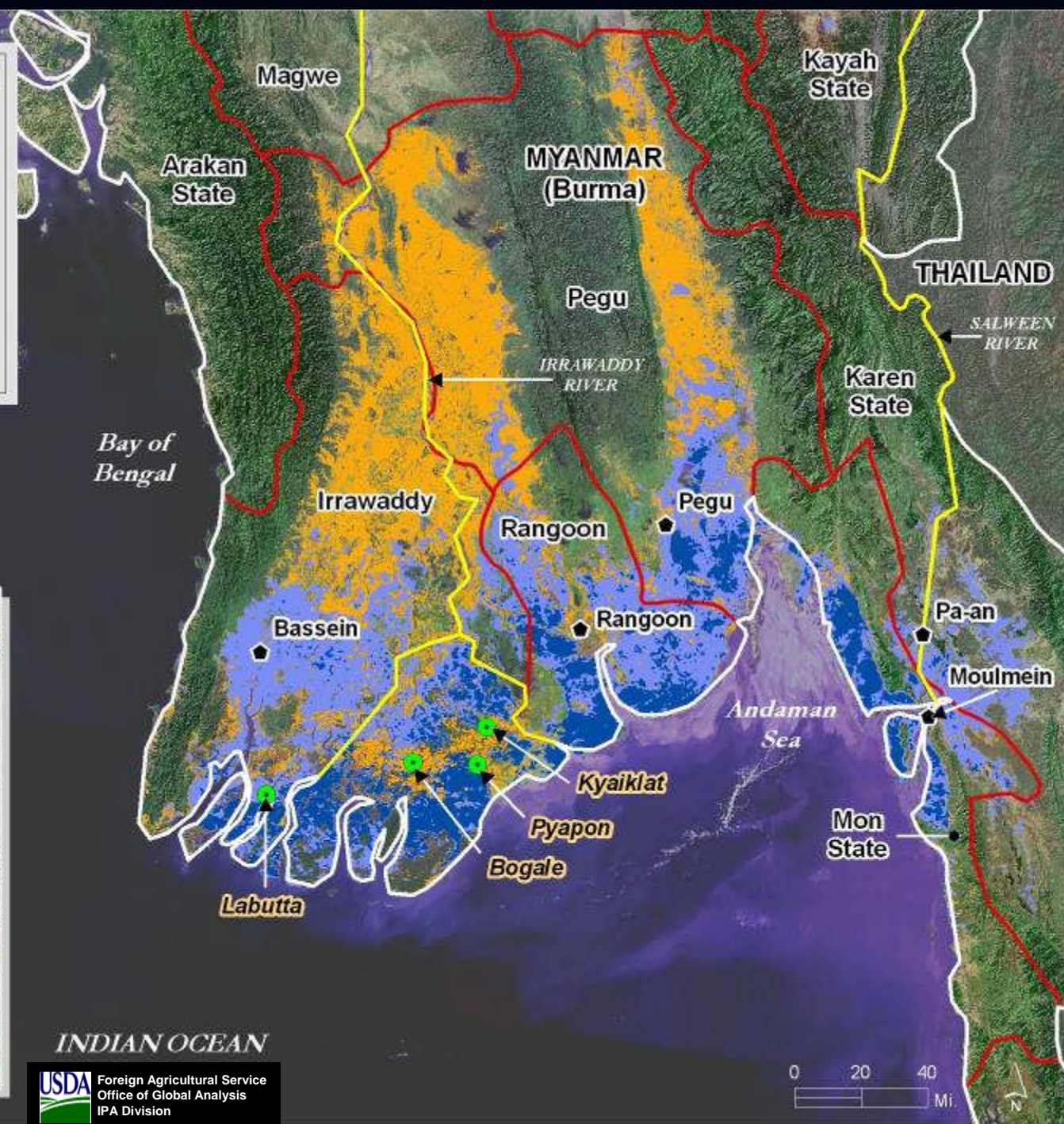


### Map Legend

- Highly Affected Villages
  - Provincial Capital
  - River
  - Rice/Paddy
  - Village - Boundary Limits
- Flood Water**
- Level of Impact**
- Least Severe
  - Most Severe



### Arable Rice/Paddy Cultivation Areas



INDIAN OCEAN



# Early Warning Tools

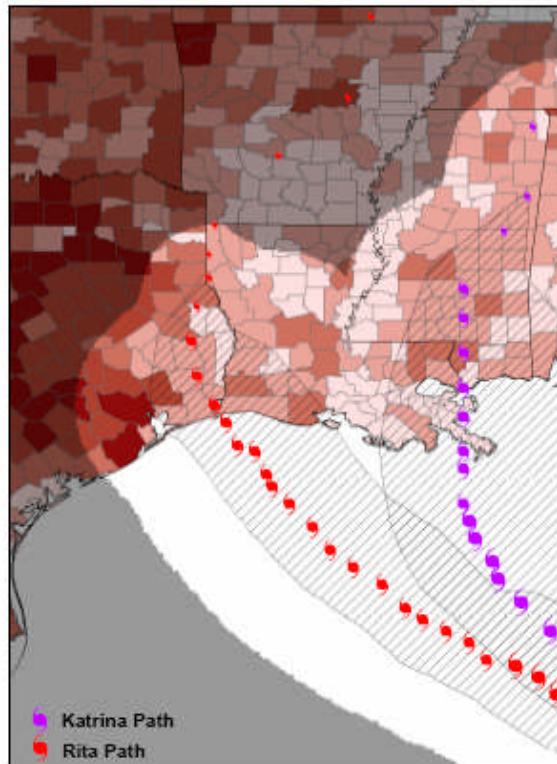
## USDA FAS OGA





# Domestic Early Warning

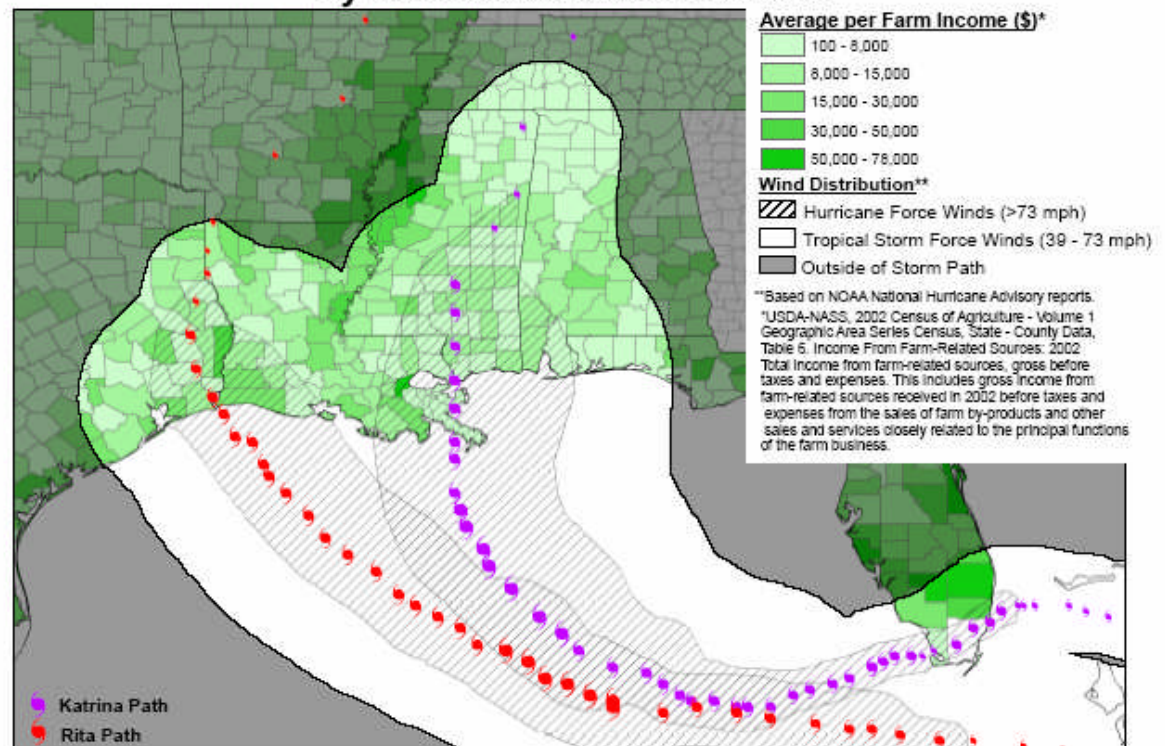
## Number of Farms in Counties Affected by Hurricanes Katrina & Rita



**USDA** United States Department of Agriculture  
Foreign Agricultural Service

Total Number of Affected Farms  
Hurricane Force Winds

## Average Income per Farm of Counties Affected by Hurricanes Katrina & Rita



**USDA** United States Department of Agriculture  
Foreign Agricultural Service



Production Estimates and  
Crop Assessment Division





# Global Reservoir and Lake Monitor



Reservoir Monitor connects satellites TOPEX/Poseidon and JASON-1 for altimeter data with Landsat data from the Landsat Global Visualization from USGS (GloVis). *An Integrated Geospatial Information Solution.*



# **Session III- Government Solutions and Research for World Food Supply Challenges-**

**“Joint Project and Policy Views”**



# Viewpoints Session III

**Jack Hild, Assistant Chief Information Officer for Data, National Geospatial-Intelligence Agency (NGA)**

- **GEOINT is a discipline that builds on many disciplines (imagery, GIS, etc.)**
- **Discussed what fuels GEOINT (elevation, imagery, vectors, SATNAV, etc.)**
- **28 Member Coalition for Northern Africa (MGCP Cooperation-Data Sharing) This is a going forward model for Interoperability**
- **MUST HAVE SPATIAL COLLABORATION**

# Viewpoints Session III

Robert Tetrault, Satellite Imagery Archive Manager, USDA FAS OGA

- Collaborative Provision of Data in IRAQ would not be possible without partnerships
- Information delivered was accurate and timely
- NEED MORE DATA – from Commercial Providers





# Viewpoints Session III

- Compton (Jim) Tucker, Senior Earth Scientist, Climate Change Program Office, NASA
  - **Global Agriculture Land Cover – time series a must**
  - **NEED MORE DATA Civilian Space Assets**
  - **Analysis**
  - **Dissemination – Crop Explorer through Collaboration**



# Viewpoints Session III

- Patrick Hudak, Foreign Affairs Officer, State Department, Bureau of Oceans, Environment and Science
  - **Population Growth**
  - **Environmental Security**
  - **Food and Agriculture are sometimes looked at similarly**
  - **Sec. of State – has highlighted Food Security Strategy as a primary interest**





## Session III Take-Away

- National Security
- Operational Monitoring Capability in Remote Areas of the Globe
- Need for Global Land Cover
- Policy Focus and Needs are now focused on Food Security



# **Global Monitoring and Analysis – OGA our Daily Mission In Perspective USDA FAS OGA**





# Global Monitoring and Analysis - OGA our Daily Mission

- Timeliness
  - Latency of derived information
- Objectivity
  - Balanced
- Reliability
  - Science (repeatable)
- Accuracy
  - Mapping
- Global
  - Satellite observations
- Cost
  - Efficient



# Iraq Operational Ag Monitoring Project



## •Operational Success

- Allows Provincial Reconstruction Teams (PRTs) information over time
- Accurate and Timely
- Methodology is Correct
- Within 1% margin of error in Iraq – imagery was timely





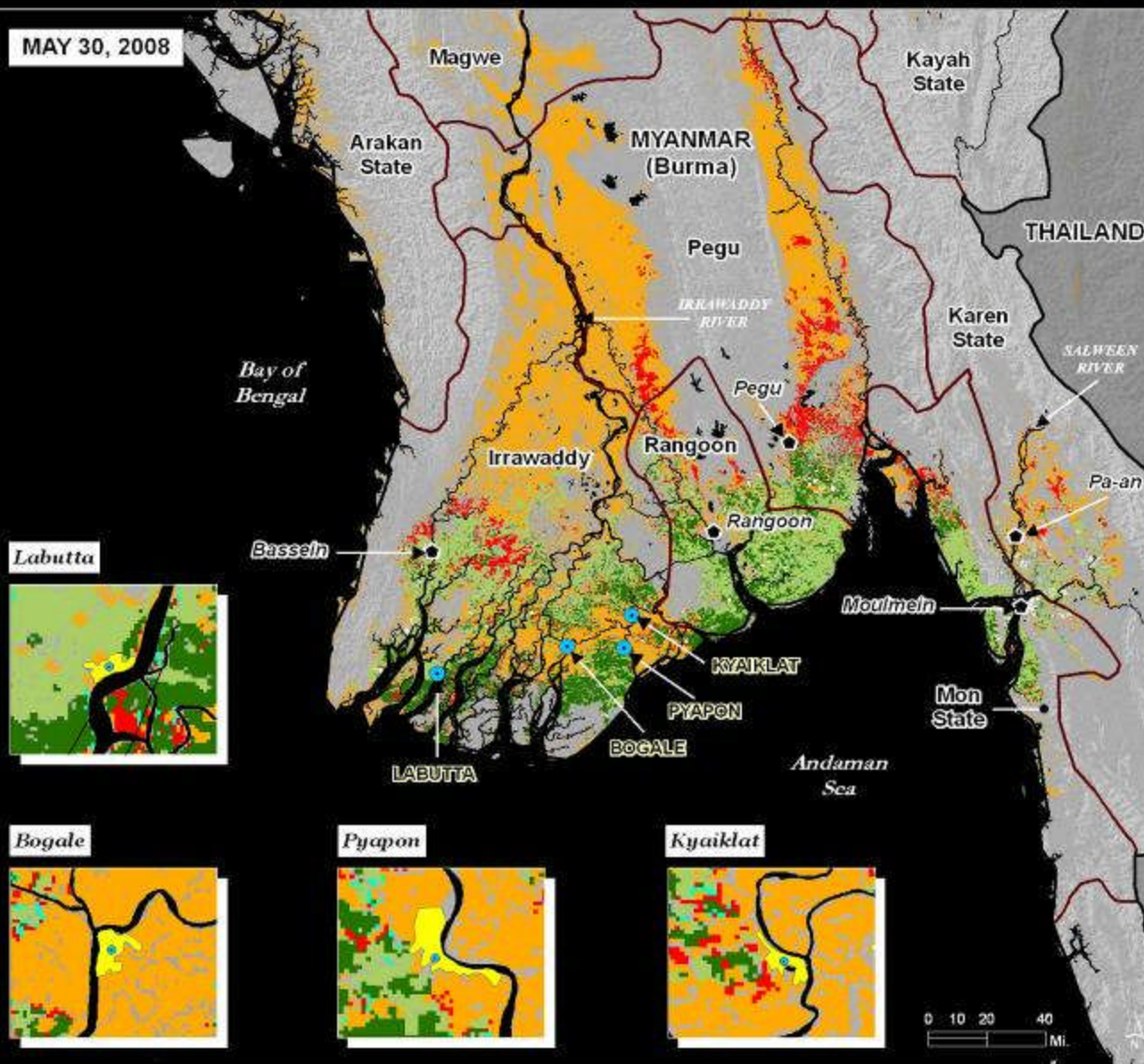
# Global Monitoring and Analysis

## – OGA our Daily Mission

- Timeliness
  - Latency of derived information
- **Objectivity**
  - Balanced
- Reliability
  - Science (repeatable)
- Accuracy
  - Mapping
- Global
  - Satellite observations
- Cost
  - Efficient

# Myanmar (Burma) - Cropland Recovery Analysis of Tropical Storm Nargis - 2008

MAY 30, 2008



## Map Legend

- Highly Affected Villages
- Provincial Capital
- Village - Boundary Limits
- Water

## Flood Recovery Analysis

- Never Flooded - Rice/Paddy Areas
- Full Recovery
- Flooding Improved
- Flooding Worsened
- No Change
- Data Gaps In More Than One Date

Imagery Sources: MODIS Terra 250m 1.2-1,  
NASA, USGS-EROS Data Center,  
IG Sources: USDA, ASRCMS, ESRI,  
GDA (Thematic Composite), GeoCover LC (2000),  
VMAP (Level 1)  
Projection: GCS\_WGS\_1984  
MODIS Terra Rapid Response System imagery  
updates every day, at about 1200Z, with images  
taken during the previous day.  
Producer: ASRC Management Services (5/4/08)

USDA United States Department of Agriculture  
Foreign Agricultural Service

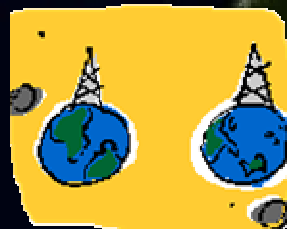




# Global Monitoring and Analysis – OGA our Daily Mission

- Timeliness
  - Latency of derived information
- Objectivity
  - Balanced
- **Reliability**
  - Science (repeatable)
- **Accuracy**
  - Mapping
- Global
  - Satellite observations
- Transparency
  - Open
- Cost
  - Efficient

# Convergence of Evidence, All-Source Methodology



FAS Attaché Ground Truth

RELIABLE

OBJECTIVE

TIMELY

TRANSPARENT

GLOBAL

ACCURATE

COST



Land Surface  
Remote Sensing

Atmospheric  
Remote Sensing



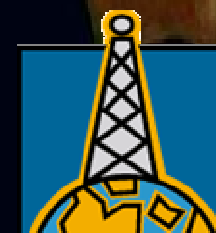
Ground Truth

External Ground Truth  
(Cntry Rpts/News Services)

Office of  
Global  
Analysis  
(OGA)

Global Food Supply

Food Aid Agencies  
Ag Industry  
Gov't Policy Makers





# Global Monitoring and Analysis – OGA our Daily Mission

- Timeliness
  - Latency of derived information
- Objectivity
  - Balanced
- Reliability
  - Science (repeatable)
- Accuracy
  - Mapping
- **Global**
  - Satellite observations through Partnerships
- **Cost**
  - Efficiency through Partnerships



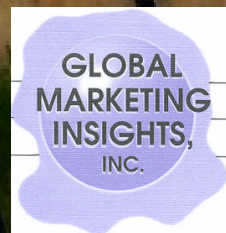
# USDA FAS OGA-Satellite Imagery Archive (USDA-SIA)



## Multi-Vendor, High Volume Satellite Observation Input

Annual Seminar:

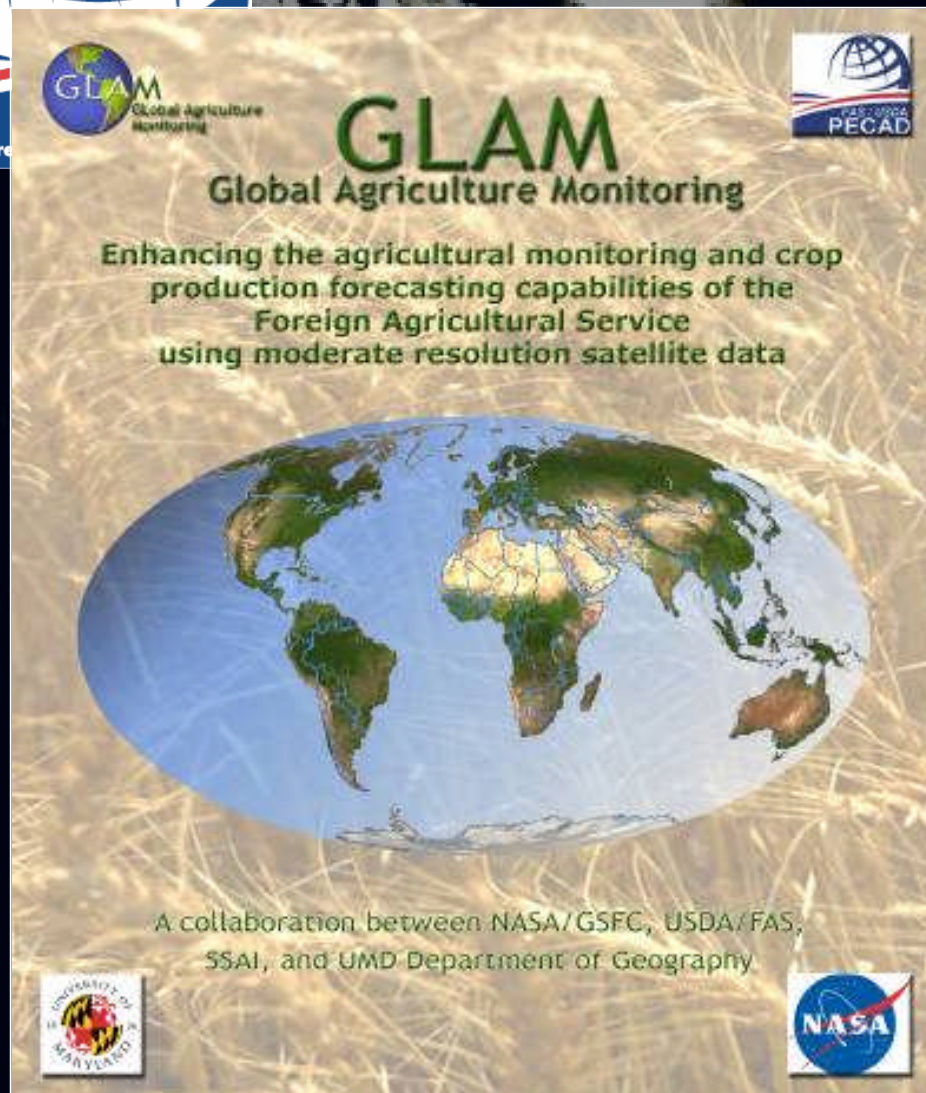
[http://www.pecad.fas.usda.gov/ipa\\_seminar2007.htm](http://www.pecad.fas.usda.gov/ipa_seminar2007.htm)



GDA Corp.







**GLAM is the NASA-USDA**  
led partnership to  
leverage NASA  
technology to improve the  
FAS global agriculture  
monitoring and reporting  
mission.

...research labs

...private sector

...others.....

<http://www.pecad.fas.usda.gov/glam.cfm>



# The Value Proposition of USDA FAS OGA in the Management of Global Food Security

“Information Requirements Increase  
with Increasing Uncertainty”



# Crop Explorer Portal

Portal to near-real time global agriculture conditions

[www.pecad.fas.usda.gov/cropeexplorer](http://www.pecad.fas.usda.gov/cropeexplorer)

or

Google “crop explorer”







# Crop Explorer Overview

USDA FAS

## Explore by Region

### North America

United States  
Canada

### Central America

Mexico  
Central America  
and Caribbean

### South America

Brazil  
Northern South  
America  
Southern South  
America

### Europe

Europe

### Middle East

Iran, Iraq, Syria and Turkey

### Oceania

Australia

### Former Soviet Union

Kazakhstan  
Russia, Azerbaijan,  
Armenia and  
Georgia  
Ukraine, Moldova,  
and Belarus

### Africa

North Africa  
Southern Africa  
East Africa  
West Africa

### Asia

Eastern China  
South Asia  
Southeast Asia  
Central Asia  
Korea

Site Index



## Explore by Crop

Select a Commodity

Submit

## Commodity Intelligence Reports

### China Winter Wheat Planting Situation - 2007/08 Season.

(Nov 01, 2006)

The planting season is ending for China's 2007/08 winter wheat crop, which was sown in September and October 2006 and will be harvested in May and June 2007. Mostly dry and warm weather allowed for rapid planting progress, but soil moisture levels in the main production areas are low and additional rain would help promote emergence and tillering before the crop enters dormancy in December.

### Argentina Wheat Update: Rainfall Just in Time.

(Oct 27, 2006)

As dryness continued from early wheat planting in May until the early growth stages in September, Argentina's 06/07 wheat crop outlook was dire. Earlier this season, dryness hampered planting progress, such that planting intentions were decreased in July, August, and September in reports published by Argentina's Ministry of Agriculture

## Partnerships



## News & Events

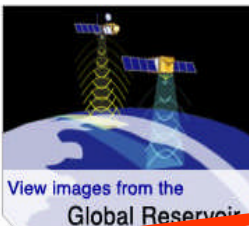
- Lake Victoria's Falling Waters
- The FAS Crop Explorer: A Web Success Story

## Related Sites

- Agricultural Production
- Foreign Agricultural Service
- Future of Land Imaging
- Global Reservoirs/Lakes
- Landsat GloVis
- MODIS Image Gallery
- MODIS NDVI Gallery
- MODIS NDVI Time Series
- MPA Accumulated Rainfall Maps
- PECAD

## Metadata

- Live Data and Maps
- GeoSpatial One-Stop
- NASA Global Change
- GeographyNetwork

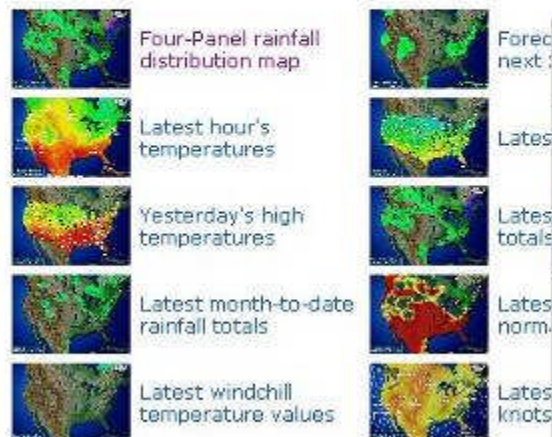


- Click on map to explore by region
- Review latest Commodity Intelligence Reports
- Connect to portal data from technology transfer partners
- Visit partners



- Wireless Quotes
- CBOT Advantage
- CBOT DataExchange
- Real-Time Quotes & Charts
- Commodity News for Tomorrow
- Delayed Quotes & Charts
- Time & Sales
- Settlement Prices
- Volume & OI
- Reports
- Historical Data
- Historical Volatility
- Commentaries
- Delivery Reports
- Liquidity Analyzer
- Weather**
- Data Vendors
- Market Data Online Billing

## Weather as of October 5, 2006 6:05 PM



### US Regional Radar Maps



http://www.pecad.fas.usda.gov - Crop Explorer for Major Crop Regions - Home - Microsoft

File Edit View Favorites Tools Help

**USDA** United States Department of Agriculture  
**Foreign Agricultural Service**

**Crop Explorer**

**Explore by Region**

**North America**  
United States  
Canada

**Central America**  
Mexico  
Central America and Caribbean

**South America**  
Brazil  
Northern South America  
Southern South America

**Europe**  
Europe

**Middle East**  
Iran, Iraq, Syria and Turkey

**Oceania**  
Australia

**Former Soviet Union**  
Kazakhstan  
Russia, Azerbaijan, Armenia and Georgia  
Ukraine, Moldova, and Belarus

**Africa**  
North Africa  
Southern Africa  
East Africa  
West Africa

**Asia**  
Eastern China  
South Asia  
Southeast Asia  
Central Asia  
Korea

Site Index

The Crop Explorer Web Site features near-real-time global crop condition information based on satellite imagery and weather data. Thematic maps of major crop growing regions depict vegetative vigor, precipitation, temperature, and soil moisture. Time-series charts depict growing season data for specific agro-meteorological zones. Regional crop calendars and crop area maps are also available for selected regions.

<http://www.pecad.fas.usda.gov/cropexplorer/index.cfm>



# ANNOUNCING the USDA FAS OGA "GEOINT" ONLINE



## USDA Foreign Agricultural Service (FAS) Office of Global Analysis

### FAS HIGHLIGHT

"Global Food Security Challenges:  
Monitoring Earth's Resources"  
Summit

April 22, 2009

Ronald Reagan Building and  
International Conference Center  
Washington D.C.

USDA Foreign Agricultural Service  
(FAS) Office of Global Analysis  
partners with DoD, NASA, USAID  
and State Department to address  
these challenges

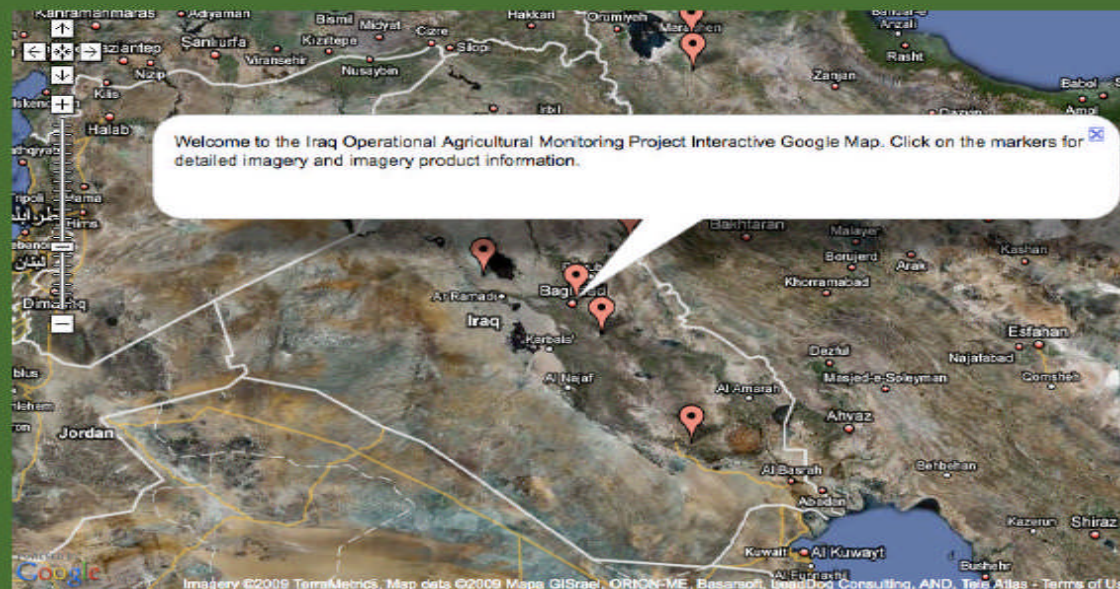
Featured Speakers:  
DoD  
NGA  
USAID FEWS-NET  
The State Department  
NASA

[Click Here to Register](#)

### PROJECT PARTNERS

## Iraq Operational Agricultural Monitoring Project

For more information about this project, as seen in Military Geospatial Technology, October 2008 article, "Eye On the Farm", [click here](#)



\*Note: When exploring the interactive Google Map, click on the markers for project information and imagery. Click on the [x] button to expand individual markers for detailed.

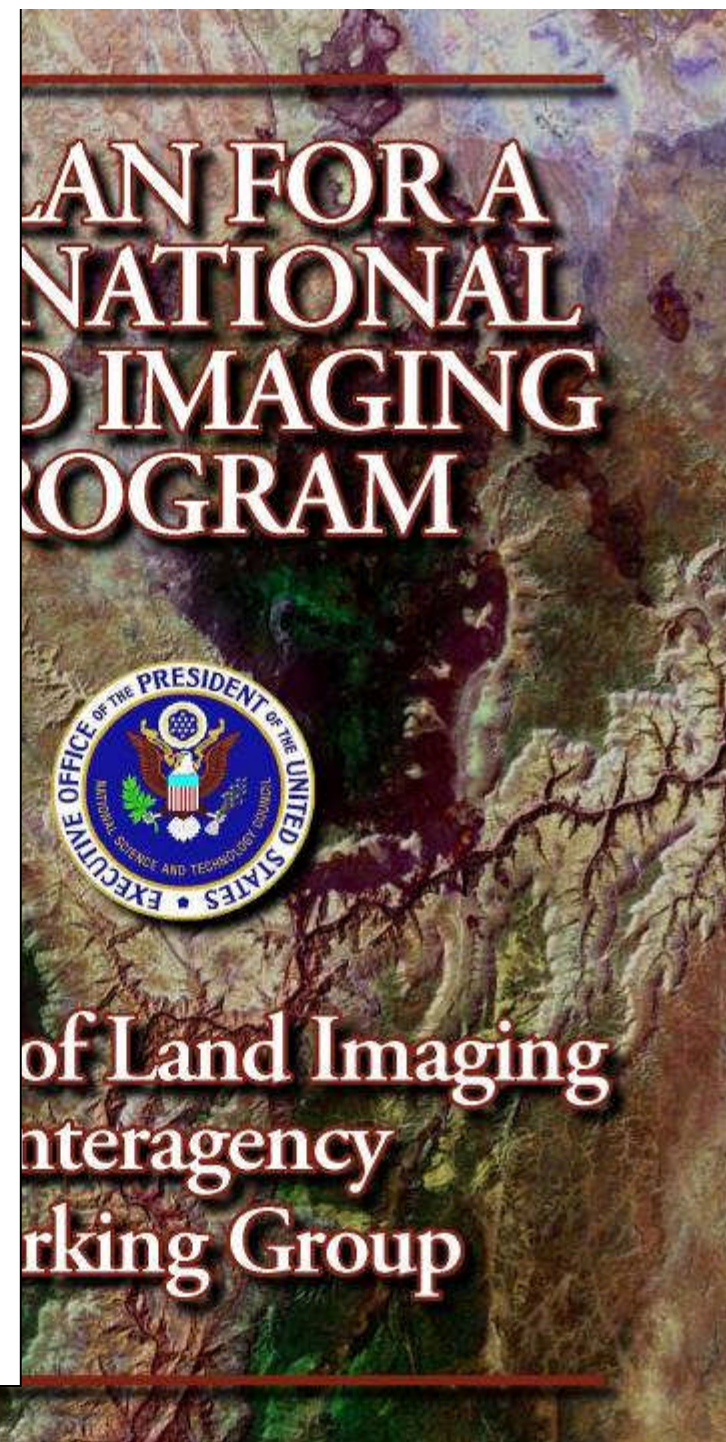


# Policy Needs

**USDA FAS OGA**



*“It presents a set of policy recommendations to achieve a stable and sustainable U.S. operational space-based land imaging capability....”*







# ***Global Monitoring and Analysis – OGA our Daily Mission***

**USDA Summit PRESENTATIONS**

**[www.pecad.fas.usda.gov/cropeexplorer](http://www.pecad.fas.usda.gov/cropeexplorer)**

**AVAILABLE**

**or**

**Google “crop explorer”**

**THANK YOU AND ENJOY THE RECEPTION**